

Teacher Background Information On the Trail of Digestion (SC070104)

Tips for Preparation

Boil the eggs and separate the whites into four pieces of approximately equal mass. Since you will be looking at change in mass and shape, small differences are acceptable but middle schoolers have a great deal of problem with proportionality so make them as close to the same as possible.

It's advisable to maintain only dilute HCl in a middle school lab. If you must dilute stock solution to make .5 M remember to *add acid to water, to wear goggles, and to do it in the prep room away from students*. Powdered pepsin is available from all chemical supply houses and (in slightly less reliable form) from health food stores. Dilute about 40 grams of powdered pepsin with 20 ml water to make a solution for this experiment.

The rate at which digestion will take place will depend upon pH, concentration of pepsin, and temperature in the room. You can adjust the experiment to your class period (hours or blocks) or slow it down (in a cool place) if you must return to it the next day.

Historical readings

These short readings have deliberately not been edited for a lower reading level, to give students some impression that they are reading primary documents (although only small sections are actual quotes.) It is important to give students plenty of time and encouragement to decipher the antiquated language

Students will remember that Spallanzani as the skeptic who helped disprove spontaneous generation. (Just as he questioned Reaumur, he challenged the famous English scientist John Needham and again proved that faulty scientific methods were used.) If they have not read that information, the experiment is cited here:

<http://www.kent.wednet.edu/staff/rlynch/sci_class/chap01/spallanzani.html>.

The quotations from Spallanzani are cited in:

The Physiology of Digestion by Andrew Combe, M.B. (1837)

The reading contains a page from Wm. Beaumont's original work. His experiments were almost immediately respected throughout the world. Assure students that Alexis St. Martin lived, married, and had children after the experimental work.

Assessment Rubric

Many teachers hesitate to give essay assessments because of the perception that the grading may be subjective. The key is to develop a sound rubric prior to grading the test, and share that rubric with the students. Here is one rubric that might be used with the “hamburger” essay:

Level	Achievement
0	Student does not express an understanding that food passes through a number of organs in the process of digestion.
1	Student expresses the understanding that food passes through a number of organs in the process of digestion, but does not describe either physical or chemical digestion in each organ.
2	Student expresses the understanding that food passes through a number of organs in the process of digestion, and describes either physical or chemical digestion in each organ but not both.
3	Student expresses the understanding that food passes through a number of organs in the process of digestion, and describes both physical and chemical digestive processes.
4	Student expresses the understanding that food passes through a number of organs in the process of digestion, describing physical digestion in the mouth and stomach (including chewing and grinding) and chemical digestion in mouth, stomach and intestines.